



Technical Consultation, Data Analysis and
Litigation Support for the Environment

2656 29th Street, Suite 201
Santa Monica, CA 90405

Matt Hagemann, P.G, C.Hg.
(949) 887-9013
mhagemann@swape.com

June 13, 2016

Maya Golden-Krasner
Center for Biological Diversity
1212 Broadway, Suite 800
Oakland, CA 94612

Subject: Comments on the Arroyo Grande Aquifer Exemption Response to Comments

Dear Ms. Golden-Krasner:

These comments are prepared to address the adequacy of the April 28, 2016 Freeport McMoRan Oil and Gas, LLC ("Freeport") response to the US EPA Supplemental Data Requests ("Responses"). Specifically, these comments address the Freeport response to the comments SWAPE made in a December 14, 2015 letter in the Responses.

Freeport has yet to conduct aquifer tests and numeric groundwater models to demonstrate the proposed exempted area is hydraulically isolated from the aquifer used for drinking water. The analytical capture zone analysis presented in the Responses by Freeport is fundamentally inferior to the numerical modeling I recommend. The capture zones use a simple equation to estimate the areas that are purported to contribute flow to the adjacent drinking water wells, but the analysis is based on a critical assumption that is not known to be applicable to the hydrogeologic setting of the area proposed for exemption.

The analysis assumes a no-flow or an impermeable boundary for the fault that bounds the northern area proposed for exemption. As we have recommended, this assumption needs to be tested through physical aquifer tests and numeric modeling.

Using a no-flow boundary is inappropriate for the fault, unless confirmed through testing and modeling, because the area proposed for exemption is in the same geologic unit that is tapped by drinking water wells just a few hundred feet away, to the north. Testing the potential for water to intercommunicate across this "thin blue line," through aquifer tests and numerical modeling, is critical for protection of the adjacent drinking water wells. Simply assuming a no flow boundary, as Freeport did, perpetuates the untested idea that the fault is impermeable and that flow of groundwater from the exempted area will not cross the fault.

The results of the analytical capture zone analysis, while in no way sufficing as numeric modeling, are concerning. The capture zones calculated by Freeport verge up to and intersect the boundary of the fault as shown in Figure 5. These results show the drinking water wells would in fact be in communication with the exempted area if the fault is transmissive to flow.

Other boundary conditions, cited as impermeable to groundwater flow, include a facies change (due to a stratigraphic textural change) and a tar seal. No additional evidence was presented in the Responses that these boundaries are in reality, impermeable. Again, numerical modeling and aquifer testing is necessary to show that wells across these boundaries will not draw water from the exempted area. Until such testing and modeling is conducted, the capture zone analysis should not be relied upon for decision making by regulatory agencies for this exemption application.

Sincerely,

A handwritten signature in dark ink, appearing to read "Matt Hagemann", with a stylized, flowing script.

Matt Hagemann, P.G., C.Hg.